Name: ______________________________________ Date: ___________________

A2CC Even and Odd Functions

Warm Up:

1. The quadratic function $f(x)$ has a turning point at $(5,-8)$. If $g(x)=f(x+7)-3$, then at which of the following does $g(x)$ have a turning point?

(1) $(-2,-11)$ (3) $(-7,-3)$

(2) $(12,-11)$ (4) $(12,-5)$

Recall that functions are simply rules that convert inputs or _____________ values into outputs or ____________.

EVEN AND ODD FUNCTIONS

A function is known as **even** if $f(-x)=f(x)$ for every value of *x* in the domain of $f(x)$.

A function is known as **odd** if $f(-x)=-f(x)$ every value of *x* in the domain of $f(x)$.

***Exercise* #1:** Look at the definitions above and try to determine what they say about the inputs and outputs for these types of functions then write down your interpretation on the lines below. Remember that $f(x) = y$.

1. Even Functions: ____

____

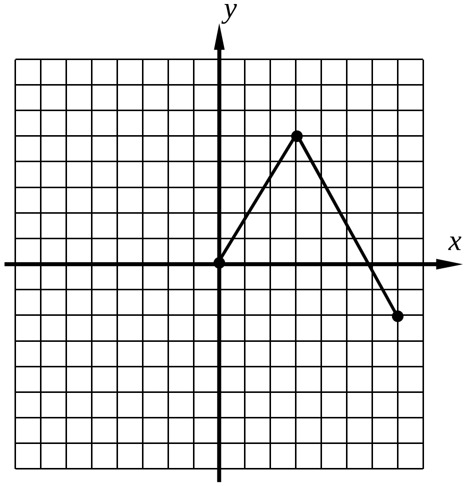
2. Odd Functions: ____

____

Let's take a look at **even** and **odd** functions first from a graphical standpoint.

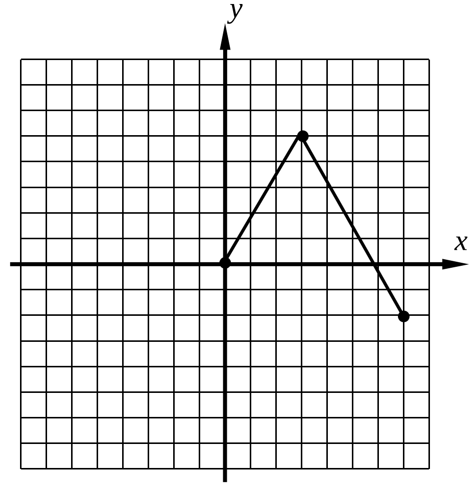
***Exercise* #2:** Consider the **partial graph** of the function $f(x)$ shown twice below. Sketch the other half of the function if in (a) $f(x)$ is **even** and in (b) $f(x)$ is **odd**. The three coordinate pairs are listed to help you plot.

(a) **even**



$(0, 0)$, $(3, 5)$, $(7, -2)$

(b) **odd**



$(0, 0)$, $(3, 5)$, $(7, -2)$

(c) Describe the symmetry of the **even** graph and the **odd** graph. Use as technically correct terminology as you can from your studies in Geometry.

EVEN:

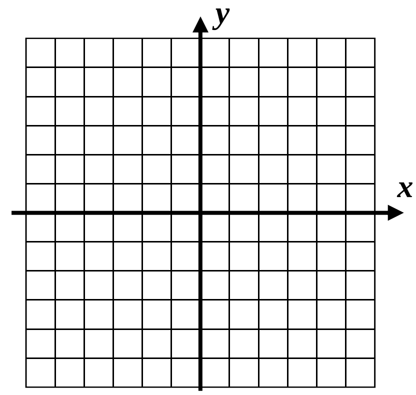
ODD:

Some of the functions you have seen in your studies so far are even, some have been odd, and many have been neither. Let's take a look at a variety of functions and consider whether they fall into one of these categories.

***Exercise* #3:** Consider the function $f(x)=|x|-4$.

(a) Evaluate this function for a variety of opposite input pairs. What type (even, odd, or neither) does *f* appear to be?

(b) Sketch $f(x)$ on the grid below *without* the use of your calculator. Does it have the correct symmetry for your choice in (a)?

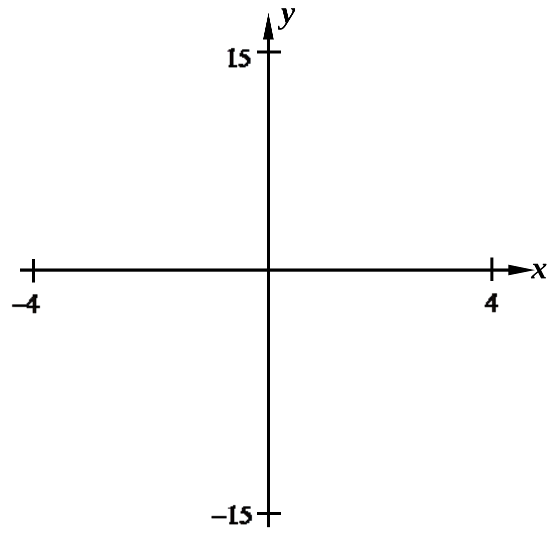


***Exercise* #4:** Let's investigate $g(x)=x^3-4x$.

(a) Use your calculator's table option to fill in the following table. What type of function is this. Explain.

x	$g(x)$
-3	
-2	
-1	
0	
1	
2	
3	

(b) Sketch a graph of $g(x)$ using your calculator and the window indicated.



***Exercise* #5:** Is the simple exponential function $f(x)=2^x$ odd, even, or neither? Support your argument with numerical evidence.

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A2CC Even and Odd Functions

EVEN AND ODD FUNCTIONS
COMMON CORE ALGEBRA II HOMEWORK

FLUENCY

1. Given the partially filled out table below for $f(x)$, fill out the rest of it based on the function type.

(a) Even

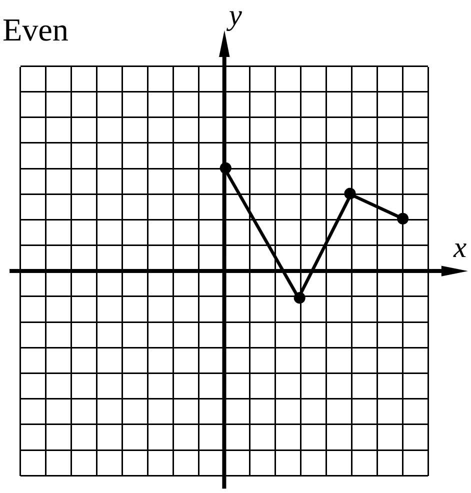
x	–3	–2	–1	0	1	2	3
y	5		–7	4		–4	

(b) Odd

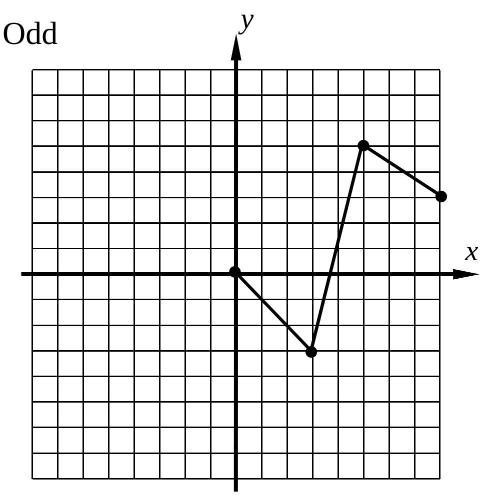
x	–3	–2	–1	0	1	2	3
y	5		–7	0		–4	

2. Half of the graph of $f(x)$ is shown below. Sketch the other half based on the function type.

(a) Even



(b) Odd



3. If $f(x)$ is an even function and $f(3)=5$ then what is the value of $4f(3)+2f(-3)$?

(1) 30 (3) 10

(2) 60 (4) 6 __________

4. If $g(x)$ is an odd, one-to-one function and if $g(7)=-2$, then which of the following points *must* lie on the graph of the inverse of $g(x)$, $g^{-1}(x)$. Explain how you made your choice.

(1) $(-7, 2)$ (3) $(2, 7)$

(2) $(2, -7)$ (4) $(7, -2)$ __________

5. Which of the following functions is even? Explain how you arrived at your choice.

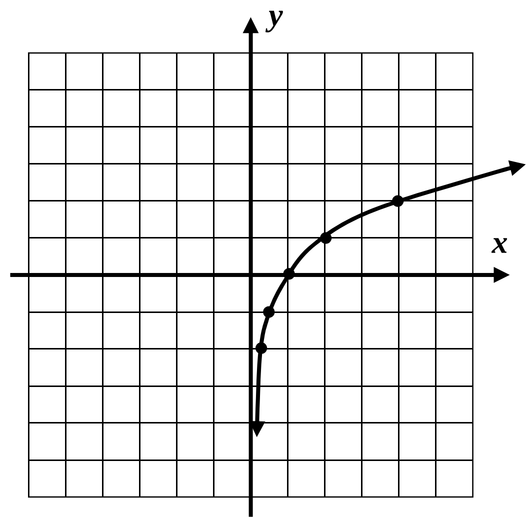
(1) $y = x^2 - 4x$ (3) $y = 9 - x^2$

(2) $y = |x - 6|$ (4) $y = 4^x$

6. The function $f(x) = \dfrac{4x^2 + 2}{x}$ is either even or odd. Determine which by exploring the function using tables on your calculator. Provide evidence for your final choice.

7. Generally, logarithms are not defined for negative inputs. This obstacle can be overcome by composing a logarithm function with an absolute value function. Consider the function $f(x) = \log_2 |x|$.

(a) If the graph of $y = \log_2(x)$ is shown below, sketch the other half of *f*.



(b) What type of function is $f(x)$?

REASONING

8. You may have noticed that every odd function that we drew that was defined at $x = 0$ passed through the origin, $(0, 0)$. Why must this always be true?

9. Even functions have symmetry across the *y*-axis. Odd function have symmetry across the origin. Can a function have symmetry across the *x*-axis? Why or why not?